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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/685,042	10/10/2000	Shuichi Kobayashi	35.G2657	3110

5514 7590 04/25/2003

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EXAMINER

CHANG, AUDREY Y

ART UNIT	PAPER NUMBER
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2872

DATE MAILED: 04/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/685,042

Applicant(s)

KOBAYASHI, SHUICHI

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,7,11,13,15,17 and 18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,7,11,13,15,17 and 18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 12 February 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>10</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on February 12, 2003, which has been entered as paper number 12.
- By this amendment, the applicant has amended claims 1, 4, 7, 11, 13 and 15, has canceled claims 3, 6, 8, 12, 14, and 16 and has newly added claims 17 and 18.
- Claims 1, 4, 7, 11, 13, 15 and 17-18 remain pending in this application.

Drawings

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on February 12, 2003 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance. (A formal drawing filed on April 11, 2003 has been received in the file).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1, 4, 7 and newly added claim 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Ogata et al.**

Claims 1, 4 and 7 have been significantly amended; new grounds of rejection are therefore necessitated and are stated as follow.

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Ogata et al teaches an *optical system* having a *front converter lens system (CL)* placed *in front of* an *iris or aperture stop*, that serves as the *pupil*, wherein the lens system comprises a double convex lens, which is a *positive* lens, having a *diffractive* surface facing the subject side and a double concave lens, which is a *negative* lens, having a *diffractive* surface facing the subject side, (please see Figure 8). Ogata et al teaches that the diffractive surface on the positive lens is having *positive power* and the diffractive surface on the negative lens is having *negative power*, (please see column 6, lines 33-36).

Ogata et al teaches that the two diffractive optical elements are made with materials of different wavelength *dispersion property*, namely they have different Abbe number, (please see column 13). The lens system is designed to operate in the visible wavelength range. With regard to claim 4, there is an air space separation between the two diffractive optical elements, (please see Figure 8). With regard to claim 7, Ogata et al teaches that the optical system further comprises other lens groups, which serve as the refractive optical devices.

This reference has met all the limitations of the claims. **Claim 1 has been amended to include the feature having a “layered diffraction optical member laminated with a plurality of diffraction parts”.** As interpreted by the specification and the drawings 1B, 4B and 6B, this phrase means that two diffraction parts are formed at *different* elements with the combination of the two elements serves as the “layered diffraction optical *member*”. With this interpretation, the CL lens having the positive lens with the positive power diffraction surface and the negative lens with the negative power diffraction surface is considered to be the “layered diffraction optical *member*”, wherein the diffraction surfaces are *laminated* on the lens elements.

With respect to newly added claim 17, Ogata et al teaches that the diffraction surfaces are of *blaze* shapes, (please see Figures 2, 6(d), 6(e) and 6(f)). Although this reference does not explicitly teach that the orientation of the diffractive surfaces are opposite to each other. However this reference does teach that the diffractive surfaces are of positive power and negative power respectively in the same

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manner as claimed by the instant application. This therefore suggests that the feature of having opposite orientation is either inherently met by the teachings of Ogata et al or an obvious matter of design choice to one skilled in the art since the specification fails to teach the criticality of having this feature would overcome problem in the prior art and the diffractive surfaces of the cited reference achieve the same function as the instant application.

4. Claims 11, 13, 15 and newly added claim 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Ushida et al.

Claims 11, 13 and 15 have been significantly amended that necessitates the new grounds of rejection are set forth in the paragraphs as follow.

Ushida et al teaches a *projection optical system* that is comprised of a *layered diffraction optical system* laminated with *diffraction optical elements* (G_1 and G_2) wherein the layered diffraction optical system is placed *behind* an *aperture stop element* (element 25 in Table 2) or *iris*, that serves as the *pupil*, of the projection optical system. Ushida et al teaches that the first diffraction optical element has a *positive* power and the second diffractive optical element has *negative* power, (please see column 6, Figures 1-2). Ushida et al teaches that the first diffractive optical element is made of glass material such as *quartz* and the second diffractive optical element is made of glass material such as *fluorite* wherein quartz and fluorite have *different wavelength dispersion property*, (please see column 6, lines 24-29). It is implicitly true that the diffractive optical elements have high diffraction efficiency in the intended wavelength range.

Claim 11 has been amended to include the features having the diffraction member to have high diffraction efficiency for diffracting light in the *visible* wavelength range. This reference teaches that the lens system is for an *optical projection system* but it does *not* teach explicitly about which wavelength range is intended for operation. It therefore does not disclose explicitly the projection lens system is

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operable in the visible range. However projection system such as *image projection system* or even exposure projection system using visible light is very well known in the art such feature is therefore either inherently met by the disclosure or an obvious modification to one skilled in the art for the benefit of allowing the projection system to be operable in the visible wavelength range.

With regard to claim 13, this reference however does not teach explicitly that the diffractive optical elements are laminated with an air layer interposed. But such modification is either implicitly included since the diffraction optical elements have stair case profile as shown in Figures 2 and 3 which makes them necessary to have air space between the two elements or an obvious modification to one skilled in the art to achieve desired diffraction/refraction property, by interposing an refractive air medium. With regard to claim 15, the projection optical system comprises other lenses that serve as refractive optical device, (pleas see Figure 2).

With respect to newly added claim 18, Ushida et al teaches that the diffraction optical elements has stair case configuration that are of blaze shapes, (please see Figures 3 and 4). Although this reference does not explicitly teach that the orientation of the diffractive optical elements are opposite to each other. However this reference does teach that the diffractive optical elements are of positive power and negative power respectively in the same way as claimed by the instant application. This therefore suggests that the feature of having opposite orientation is either inherently met by the teachings of Ushida et al or an obvious matter of design choice to one skilled in the art since the specification fails to teach the criticality of having such feature would overcome any problem in the prior art and the diffractive optical elements of the cited reference achieve the same function as the instant application.

Response to Arguments

5. Applicant's arguments with respect to claims 1, 4, 7, 11, 13, and 15 have been considered but are moot in view of the new ground(s) of rejection. The newly submitted claims 17 and 18 have been fully considered and they are rejected for the reasons stated above.

6. In response to applicant's arguments which state that the cited Ushida et al reference discloses a photolithographic projection system and make reference to "deep ultra violet region" but not visible wavelength range and by means of such feature that it is possible to suppress a lowering of the diffraction efficiency due to the dependency thereof upon the incident angle of light, the examiner respectfully disagrees for the reasons stated below. Firstly the examiner wishes to point out respectfully that Ushida et al reference discloses a *projection optical system* wherein NO SPECIFIC range of wavelength for operation is ever given. The reference to deep ultra violet region is only mentioned as a *general property* of a binary optics (BOE), (please see column 4, lines 7-14), but no where in the reference ever mentioned that the optical projection system is operable in the deep ultra violet wavelength region and such limitation cannot be applied here. A binary optics as well known in the art can be designed to diffract light in visible wavelength range, (please see the patent issued to Neal et al (PN. 5,864,381)). It is the fundamental theory of diffraction that diffraction property is determined by the phase modulation of the diffractive optical element upon the incident light wherein the phase modulation depends on the wavelength of the incident light. It is therefore an obvious modification to one skilled in the art to design the diffractive optical element that is capable of diffracting light in the visible wavelength region. Furthermore, optical projection system is widely applied in the art as for *image projection system* or *lithographic system*, wherein each of the systems can be operated by light in the visible wavelength range. The applicant is respectfully reminded that the dependence of diffraction efficiency of the angle of incident is true for light of any wavelength is not only for DUV light.

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Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent issued to Neal et al (PN. 5,864,381) teaches binary optics that is made to diffract visible light. US patent issued to Suwa (PN. 4,390,279) teaches a projection exposure system that uses both ultraviolet and visible light.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

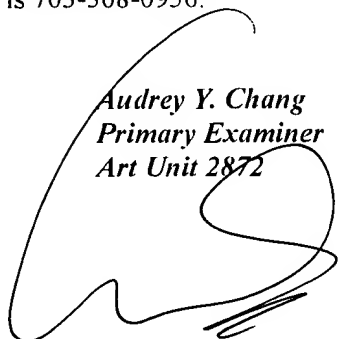
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on 703-308-1637. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Audrey Y. Chang
Primary Examiner
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A large, stylized handwritten signature in black ink, appearing to be 'A. Chang', is written over the typed name and title.

A. Chang, Ph.D.
April 22, 2003